Meaſuring made Eaſy:
OR THE
Deſcription and Uſe of
COGGESHALL's
SLIDING RULE
CONTAINING

Inſtructions for Meaſuring all manner of Timber, both by the Common Way, and the true Way. With Directions for taking the Dimenſions of Trees, and the Allowance for Bark, *&c.* Performe both by the Rule, and by Arithmetick.

By which may be Meaſured all manner of Superficies, as *Board*, *Glaſs*, *Plaiſtering*, *Painting*, *Wainſcotting*, *Tyleing*, *Paving*, *Land*, both by the Rule and Arithmetick.

By J GOOD, *Teacher of the Mathematicks*

Carefully Corrected, and much Enlarged by *J. Atkinſon*, Sen.

London, Printed for *T. Page*, *W.* and *F.*
Mount, at the *Poſtern* on *Tower-hill.* 1724

BRITISH MUSEUM

TO THE

READER.

I *Here preſent you with ſome Fruits of my ſpare Hours, wherein I have endeavoured to render the Uſe of the* Sliding Rule *more Plain and Eaſy than ever it appeared before*

I have here delivered in a few Rules, but yet in a Plain and Eaſy Manner, Problems *for the Meaſuring all Manner, of* Regular Figures, *and* Plain Superficies, *ſuch as* Board, Glaſs, Painting, Plaſtering, Paving, Tyleing, Joyners *and* Maſons *Works,* &c. *and that both by the* Sliding-Rule *and by* Arithmetick,

In the next place you have Directions for the Meaſuring all manner of Timber, or Stone by the Sliding-Rule, *and* Arithmetically, *by a new Method, whereby the True Content of Round Timber, or Trees may be found.*

I remain a Well-Wiſher to the Mathematicks,

JOHN GOOD

CHAP. I.

The Deſcription and Uſe of Coggeſhall's RULE.

THis *Rule* is fram'd three ways; *Sliding* by one another, like *Glaiſer's Rules*; *Sliding* on one *ſide* of a *Two Foot Joint Rule*; and one part *Sliding on the other*, in a Foot long, the back part being flat, on which are Sundry *Lines* or *Scales*.

Upon the foreſaid *Sliding ſide* of the *Rule*, are *Four Lines of Numbers*, three are *Double Lines*, and One a *Single Line of Numbers*; marked in the *Figure* annexed, with A, B, C, and D.

The three marked A, B, and C, are called *Double Lines of Numbers*; being figur'd 1, 2, 3, 4, 5, 6, 7, 8, 9. Then, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the End.

That Marked D, is the *Single Line of Numbers*, and Figur'd thus, 4, 5, 6, 7, 8, 9, 10, 20, 30, and 40 at the End, even with and under 10 in the *Double Line* next to it, this is called the *Gert-Line*, and is ſo marked in the *Figure*.

The Figures on the *Three Double Lines of Numbers* may be encreaſed or decreaſed at pleaſure; thus, 1 at the beginning may be called 10, 100, or 1000, then 2 is 20, 200, or 2000, ſo that when 1 at the beginning is 10, then 1 in the middle is 100, and then 10 at the End is 1000; but if 1 at the beginning is counted for 1, then 1 in the Middle is 10, and then 10 at the End is 100.

And as the Figures are altered, ſo muſt the Stroaks or Diviſions between them be alter'd in their value according to the Number of the parts they are divided into: As thus, from 1 to 2 it's divided into 10 parts, and each *Tenth*, is divided into 5 parts, and from 2 to 3 it's divided into 10 parts, and each *Tenth* into 2 parts and ſo on from 3 to 5; then from 5 to 6, it's divided into 10 parts only; and ſo on unto 1 in the Middle of the *Rule*, or the Firſt Part of the *Double Line of Numbers*. The *Second Part*, or *Radius*, is divided like the *Firſt* Radius.

The *Gert-Line* mark'd D, is divided from 4 to 5 into 10 parts, and each *Tenth* into 2 parts, and ſo on from 5 to 10, then from 10 to 20, it's divided into 10 parts, and each *Tenth* is divided into 4 parts; and ſo on all the way from 20 to 40 at the *End*, which is right againſt 10 at the *End* of the *Double Line of Numbers*.

The *Lines* on the Backſide of this *Rule that ſlides on one Side*, are theſe, a *Line* of *Inch Meaſure* from 1 to 12, each *Inch* Divided into *Halfs*, *Quarters*, and *Half-Quarters*; another *Line* of *Inch Meaſure* from 1 to 12, each *Inch* Divided into 10 *Equal Parts*; and a *Line of Foot Meaſure* being one Foot Divided into 100 *Equal parts*, and Figur'd 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 even with 12 on Inch-Meaſure

And the *Back-Side* of the *Sliding-Piece* is Divided into *Inches*, *Halves*, *Quarters*, and *Half Quarters*, and Figur'd from 12 to 24; ſo that it may be ſlid out to 2 Foot to meaſure the Length of a Tree, or any thing elſe you have occaſion to meaſure.

Note. The *Line of Foot-Meaſure* turns *Inches*, *Halves*, *Quarters*, &c. into *Decimal-parts of a Foot*, which is moſt ready for *Meaſuring* by this *Rule*, as alſo by *Arithmetick*; and it's made fully out in the Table following.

A TABLE *Reducing Inches, Halves, Quarters, and Half Quarters, into Decimal Parts of a Foot; Or, Reducing Inch-Meaſure into Foot-Meaſure.*

Inches	Decimal	Parts of an Inch						
		$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0	.000	.010	.021	.031	042	052	.062	.073
1	.083	.094	.104	.115	.125	.135	146	.156
2	.167	.177	.188	.198	.208	.219	229	.24
3	25	.26	.271	.281	.292	302	.313	.323
4	.333	.344	.35	.365	.375	385	.396	.406
5	.417	.427	.438	.448	.458	469	.479	.49
6	.5	.51	.521	531	.542	552	569	.573
7	.583	594	.604	.615	.625	.635	.646	.656
8	.667	.677	.688	.698	.708	.719	729	.74
9	.75	.76	.771	.781	.792	802	.813	823
10	.833	844	.854	865	.875	.885	89	906
11	.917	.927	.937	.948	.958	.969	.979	99

By this *Table* $\frac{1}{8}$ or *Half Quarter* of an Inch in *Foot-meaſare*, or *Decimals*, is .01, or $\frac{1}{100}$ part of a *Foot*; $\frac{1}{4}$ of an *Inch* is .021, or ſhorter .02, that is $\frac{2}{100}$ parts of a *Foot*; and ſo on in the upper Line of the *Table*. And in the next Line under it, 1 Inch is

.083 or $\frac{8}{100}$ of a *Foot*; Inch $1\frac{1}{8}$ is .094 or $\frac{9}{100}$; Inch $1\frac{1}{4}$ is ,104 or $\frac{1}{10}$, Inch $1\frac{3}{8}$ is 115, or $\frac{11}{100}$ of a *Foot*, and ſo on: And in the Firſt *Column* under *Decimals* 1 Inch .083; 2 Inches .167; 3 Inches is .25; 4 Inches .333; and ſo on to 11 Inches is .917 or $\frac{92}{100}$. All theſe may be found on the *Line of Foot-Meaſure* on the Backſide of the *Rule*.

CHAP. II.

The Uſe of the Double Scale, *ſhewing how to find the* Area *of any Plain Superficies*; and alſo *Arithmetically*

Prob. I. *To meaſure a Geometrical Square.*

BY the *Sliding Rule.* Let there be a *Square* whoſe *Sides* are each three *Feet* and a *half*. Set 1 on the *Line* B, to 3 and $\frac{1}{2}$ on the *Line* A, then againſt $3\frac{1}{2}$ on the *Line* B, is 12 Feet $\frac{1}{4}$ on the *Line* A, which is the *Content* of ſuch a *Square*.

1	2	3	*d*
4	5	6	*b*
7	8	9	*f*
c	*d*	*e*	*g*

Arithmetically.

F Par.
The Side of the Square, Feet $3\frac{1}{2}$ or 3.5
Multiplied by it ſelf ——— — — 3.5
175
105
The Product is ——— —— Feet 12.25

This *Arithmetical Operation* is thus performed, multiply the *ſide* of the *Square*, namely $3\frac{1}{2}$ or $3\frac{5}{10}$ into it ſelf, the *Product* is 1225, from which cut off 2 places, becauſe there are 2 *Decimals* in both *Fractions* and it will ſtand thus $12\frac{25}{100}$; which is 12 *Feet* and a *quarter*.

Note, The *Figure* it ſelf ſhews the *Content* in *Feet* by inſpection, for if you tell the greater *Squares*, you ſee they are 9 in number; *a* and *b*, makes 10; *c* and *d*, makes 11; *e* and *f*, makes 12; and the little *Square g* in the Corner, makes one *quarter* of a *Foot*, which is in all 12 *Feet*

More Examples by the Rule.

Length of the ſide $5\frac{1}{4}$ Feet	27 Feet and a half
Length of the ſide $7\frac{1}{2}$ Feet	56 Feet and a quart.
Length of the ſide $10\frac{3}{4}$ Feet	115 Feet and a half.
Length of the ſide 13 Feet	169 Feet

PROB.

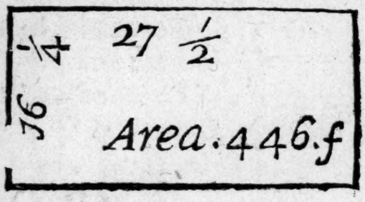
PROB. II. *To meaſure a* Long Square *by the* Sliding - Rule; *and alſo by* Arithemtick.

LET there be a *Long Square*, whoſe longeſt ſide is 27 *feet* and a *half*, and the ſhorteſt 16 *feet* and a *quarter:* ſet 1 on the *line* B, to 16¼ on the *line* A, then againſt 27½, on the *line* B, is 446 *feet* ¾, the *Content* of the *Long Square*, on the *line* A.

By Decimal Arithmetick.

Multiply the *Length* by the *Breadth*, and from the Product cut off as many Places to the Right-hand as there are *Decimals in the Length and Breadth*; the *Integers* remaining to the Left-hand are the *ſquare Feet*.

Example. F.Par
Length *Feet*, 27½ or ——— 27.50
Breadth *Feet*, 16¼ or ——— 16.25



13750
5500
16500
2750
446.8759

But Contracted thus. F.Par:

Breadth Feet 16$\frac{1}{4}$ or in *Decimals* — 16.25
Length Feet 27$\frac{1}{4}$ or 27.25 *Inverted* is 5.72

3250
1137
81

The *Product* is the *Content* req. Feet 446.8

In this *Contracted* way, Multiply each *Figure* of the *Inverted* Number (beginning at the Right-hand) by the Figure over it, and putting the ſeveral Multiplications even at the Right-hand, as above: Thus, multiplying by 2, the *Product* is 3250: Then ſay 7 time 5 is 35, leave out 5 and carry 3 in your mind, then ſay 7 times 2 is 14, and 3 I carried makes 17, ſet 7 juſt under the 0, and carry the 1 in your mind; ſaying 7 times 6 is 42, and 1 I carried makes 43, ſet 3 under 5 and carry the 4 in your mind; and ſo on to the End of that line: Then ſay 5 times 2 is 10, reject the 0, and carry 1 in your mind; then ſay 5 times 6 is 30, and 1 I carried makes 31, ſet 1 juſt under the 7, and carry the 3 in your mind; ſaying 5 times 1 is 5, and 3 I carried makes 8, ſetting it under the 3, and *Multiplying* is done: Then add them together and it's 446.8; that is *Feet* 446$\frac{8}{10}$ or 446 *Feet* $\frac{3}{4}$ as before.

Note, Where the *Units place* of the *Inverted Number* ſtands, ſo many places are to be cut off in the Product: As in this *Example*, 7 the Units place, when *Inverted* ſtands under 2, the *Firſt* Place in *Decimals*, and therefore one place muſt be cut off in the *Product*, at the Right-hand; ſo that the *Product*, 4468 muſt be 446 8 or 446$\frac{8}{10}$ Obſerve the like in all that follows.

More Examples by the Sliding-Rule.

				Contents
Breadth	11$\frac{1}{2}$ F.	Length	15$\frac{1}{4}$	174 F. and $\frac{1}{4}$
Breadth	17$\frac{1}{4}$ F.	Length	21$\frac{1}{2}$	371 F$\frac{3}{4}$
Breadth	22$\frac{3}{4}$ F.	Length	29$\frac{3}{4}$	676 F$\frac{3}{4}$

PROB. III. *How to meaſure a Rhombus by the* Sliding Rule.

SUppoſe the *Side* of a *Rhombus* be 8 *Feet* 6 *Inches* and a *quarter*, and the *Breadth*, or Line A B, 8 *Feet* 4 *Inches* and a *half*: That is the *Length* is *Feet*, 8$\frac{52}{100}$ and *Breadth* is *Feet* 8 $\frac{38}{100}$. Then ſet 1 on the *line B*, to 8 *Feet* $\frac{52}{100}$ on the *line* A; then againſt 8 *Feet* $\frac{52}{100}$ on the *line* B, is 71 *Feet* $\frac{40}{10}$ parts of a *Foot* on the *line* A; now if you would find the Value of the *Decimal*, or part of the *Foot*, look for $\frac{40}{10}$ on your *Rule*, and you will find againſt it 4 *Inches* $\frac{3}{4}$, ſo that the Content of this *Rhombus* is 71 *Feet* 4 *Inches* $\frac{3}{4}$

By Decimal Arithmetick

Multiply the *breadth* A B, by the *length* of any of the Sides, and from the *Product* cut off as many Places to the Right-hand as are *Decimals* in the *length* and *breadth*, the *Integers* remaining to the Left-hand are the *ſquare Feet* requir'd.

Example.

F. Par.

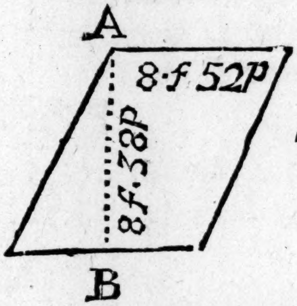
The Length *Feet* 8.06 *Inches* $\frac{1}{4}$ or 8.52

Breadth AB, *Feet* 8.04 *Inches* $\frac{1}{2}$ or 8.38

6816

2556

6816



The *Cont.* is *Feet* 71.3976

or 71 *Feet* 4 Inches $\frac{3}{4}$,

And *Contracted* is thus,

F. Par.

Length Feet 8 06 *Inches* 8$\frac{1}{4}$ is in Dec. 8.52

Breadth A B, *Feet* 8 04 *Inches* and $\frac{1}{2}$ is 8 38 *Inverted* is —— —— } 83.8

6816

255

68

The *Cont.* Requir'd as before is *Feet* 71.39

PROB.

PROB. IV. *How to meaſure a* Rhomboide *by the* Sliding-Rule.

ADmit the length of a *Rhomboide* be 17 *Feet* 3 *Inches*, or $17\frac{25}{100}$, and the true Breadth 8 *Feet* 7 *Inches*, or $8\frac{58}{100}$, what is the *Content*? Set 1 on the *line B*, to 17.25 on the *line* A; then againſt 8.58 on the *line* B, is 148 *Feet* on the *line* A.

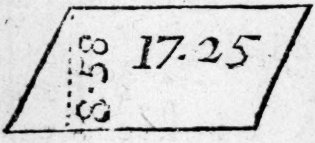
By Decimal Arithmetick.

Multiply the *length* by the *Breadth*, and from the *Product* cut off the *Decimals*, and the Remainder is the *ſquare Feet.*

Example. F.Par

The Length 17 *Feet* 3 *Inches*, or-17.25
The Breadth 8 *Feet* 7 *Inches*, or--8.58

13800
8625
13830



TheCon. is F.1483050
or 148 *Feet*.

By Contraction thus, F.Par
Length 17 *Feet* 3 *Inches in Decimals*-17.25
Breadth 8*F*. 7 *Inch. or* 8.58 *Inverted* is 8.58

13800
862
138

The *Content* as before is -- *Feet* 148.00

PROB.

PROB V. *How to meaſure a Triangle by the* Sliding-Rule.

Theorem. EVery *Triangle* is half of that *Long-ſquare* whoſe *Length* and *Breadth* is equal to the *Perpendicular* and *Baſe*. Therefore from the greateſt *Angle* let fall a line *Perpendicular*, to the ſide (oppoſite to the greateſt *Angle*) called the *Baſe*: Therefore to find the *Content* of any *Triangle*, take *half* the *Length* of the *Baſe* and the whole *Perpendicular*; or *half* the length of the *Perpendicular*, and the whole *Baſe*.

Example.

Let the *Baſe of a Triangle* be 4 *Feet*, $\frac{15}{100}$ or 4 *Feet* 1 *Inch* $\frac{3}{4}$, and the *Perpendicular* 2 *Feet* $\frac{15}{100}$ or 2 *Feet* 1 *Inch* $\frac{3}{4}$, the half of the one is 2 *Feet* 7 *parts*, and the half of the other is 1 *Foot* 7 *parts*; ſet 1 on the *line* B, to 4.15 on the *line* A, then againſt 1.07, half the *Perpendicular* on the *line* B, is 4 *Feet* and almoſt a half for the *Content*. Or if you ſet 1 on the *line* B, to 1.07 on the *line* A; againſt 4.15 on the line B, is 4 and almoſt a half on the line A. Again, another way, if you ſet 1 on the *line* B, to 4.1 on the *line* a; then againſt 2.15 on the *line* B, is 8 *Feet* $\frac{9}{10}$ (which is about 11 Inches) on the *line* A, the half thereof is 4 *F.* 5 *In.* $\frac{1}{2}$, which is the *Content* of the *Triangle*.

By Decimal Arithmetick all the 3 *ways.*

F.Par.

Way. { The whole *Baſe* is —— 4.15
The ½ *Perpendicular* is — 1.07

2905
415

The *Content* 4 *F.* 5 *In.* ½ or Feet 4.4405

2d Way { The whole *Perpendicular* — 2.15
The half *Baſe* —— —— 2.07

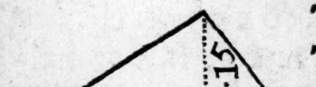
1505
430

The *Content* 4 *Feet* 5 *Inches* ½ or *Feet* — 4.4505

3d Way { The whole *Baſe* —— 4.15
The whole *Perpendicular* — 2.15

2075
415
830

The *Product* is *Feet* 8.9225
The half is *Feet* 4.4612
The *Content* is 4 *Feet* 5
nches and ½, as before.

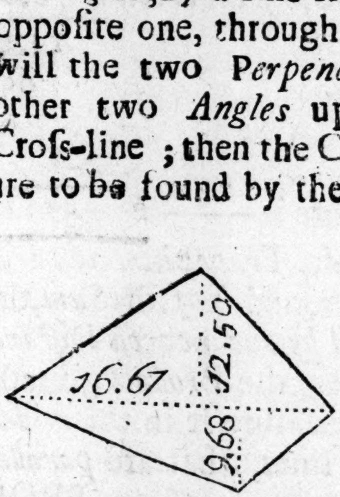


By *Contraction* thus, F. Par.

The whole *Baſe* ——— ——— 4.15
Whoſe *Perpendicular* 2.15 *Inverted* is 51.2
830
41
21
The *Product* is ——— ——— 8.92
Half is the *Content* 4 F. 5½ In. as before 4.46

PROB. VI. *Of the Meaſuring a* Trapezium.

A *Trapezium*, is a *Figure* of 4 Sides, but is not a *Square*, a *long Square*, a *Rhombus*, nor a *Rhomboide*; which before it can be meaſured muſt be divided into *Triangles*, by a line from one *Corner* to his oppoſite one, through the *Trapezium*; ſo will the two *Perpendiculars* fall from the other two *Angles* upon this *Diagonal*, or Croſs-line; then the *Content* of the *Figures* are to be found by the laſt *Problem*.



Example, Suppoſe the Dimenſions of a *Trapezium* were as followeth, the *Baſe*, is 16 *Feet*, 8 *Inches* the one *Perpendicular* 12 *Feet* 6 *Inches*, and the other 9 *Feet* 8 *Inches*, what is the *Content?*

Decimally.

	F.Par
One *Perpendicular* 12 *Feet* 6 *Inch*. or-	12.50
the other 9 *Feet* 8 *Inches*, or ——	68
The Sum is —— —— ——	22.18
The ½ Sum is —— —— —	11.09
Multiplyed by the whole *Baſe* ——	16.67
	7763
	6654
	6654
	1109
The *Content* 184 F. 10 *In*. ½ or *feet*	184.8703

By *Contraction* thus.

	F.Par.
½ Sum of the two *Perpen*. 11 F. 1 *In*. or	11.08
Baſe 16 F. 8 *Inch*. or 16.67 *Inverted* is	76.61
	11.08
	665
	67
	8
The **Content** as before is ——	F [illegible] 8

Note, If 2 ſides of a *Trapezium are parallel*, add them together, and *half* the *Sum*, this *half Sum multiplied by the neareſt Diſtance* betwixt thoſe 2 ſides, the *Product* gives the *Content*. Or if you meaſure it in the *middle* betwixt thoſe two lines, that are *parallel*, it will be the ſame.

PROB.

PROB. VII. *To meaſure any Regular Figure.*

OF theſe *Regular* F*igures* there are ſeveral ſorts, as the P*entagon*, contained under 5 *ſides*; the *Hexagon*, contained under 6 *ſides*; the *Heptagon* contained under 7 *ſides*; and the *Octogon*, contained under 8 *ſides*, *&c.*

Now to meaſure any of theſe ſorts of *Figures* practically, it is by dividing them into *Triangles*, which is done by drawing lines from the *Center* of the F*igure* to every *Angle*, then from the *Center* to the middle of any one of the T*riangles ſides*, draw a line, which line is the P*erpendicular*. Having the P*erpendicular* and *Baſe* of any of theſe *Triangles* (by P*rob*. 5) find the *Content* of one *Triangle*, and that *multiplied* by the number of *Triangles*, finds the *Content* of the F*igure*.

Note, To find the *Center* of any *Regular* F*igure*, of even Number of ſides, draw a line from one *Angle* to its oppoſite, the middle of which is the *Center*; but if your *Figure* have any *odd Number of ſides*, as 5, or 7, *&c.* draw a line from any *Angle* to the middle of the ſide oppoſite, the middle of which line is the *Center*.

CHAP. III. *The Uſe of the* Girt-line, *and line of Numbers called the* Double-ſcale, *in meaſuring of Circles and their* Parts.

Prob. I. LEt the *Diameter* of a Circle be *feet* $\frac{25}{100}$, to find the *Content* ſet 11 on the *Gert-line* D, to 95 on the *Double line* C; then againſt 2 feet $\frac{15}{100}$ on C the *Girt-line*, is 3 feet $\frac{98}{100}$ on the *Double-ſcale of Numbers* D, which is the *Content.*

Arithmetically.

The Rule. Multiply the *Diameter* in *Inches* by it ſelf, and then by this fixt *Number* .7854, and from the *Product* cut off from the *Right-hand four Figures*, the Remainder to the Left-hand is the *Content* of the *Circle in Inches*, which divided by 144, gives the *Feet*, and the *Remainder*, if any, divide by 12, gives the *Inches*.

Examp. The Fixt Number——7854
The *Diameter* multiplied ——— 729 Inches
70686
The Diameter 27 *Inches* 15708
The Diameter 27 *Inches* 54978 F. *In.*
189 144)573·5566)3.11
54 432
Dia. Multipli'd 729 *Inch.* 12) 141
12
021
012
09

The *Content* 3 *foot* 11 *Inches* ¾

The *Rule may be thus*, Multiply the *Diameter* in *Foot-meaſure* by it Self, the *Product* is call'd the *Square of the* Diameter, then *Multiply* by the firſt *Number* 0,7854 in the *Contracted way*, and this laſt *Product* is the *Content* Requir'd, as follows. F.Par.

The *Diameter* 2 *Feet* $\frac{25}{100}$ or ——— 2,25
The *Diameter* 2 Feet $\frac{25}{100}$ *Inverted* is-52.2

450
45
11

The S*quare of the* Diameter is Feet---5.06
The fixt Number 0·7854 *Inverted* is-4587

3542
405
25
2

Content 3 *F.*11 I*nch.* $\frac{3}{4}$ almoſt,or *Feet*-3.974

PROB. II. *To find the Content of a Semicircle*,

BY having the *Diameter* by the *laſt Problem*, find the *Content* of the whole *Circle*, the half thereof is the *Content* of the *Semicircle*. I think this needs no *Example*:

PROB. III. *To find the Content of a Quarter of a Circle, commonly called a* Quadrant.

Example. THere is a *Quadrant*, whoſe *Semidiameter* is 7 feet, and the Circuit of the Arch is 11 Feet, what is the *Content* ? Set 1 on the *Double-line* B, to 7 the *Semidiameter* on the *Double-line* A, then againſt 5 feet $\frac{50}{100}$ (which is *half the Circuit* of the *Arch*) on B, is 38 $\frac{1}{2}$ on A the *Content*, 38 *Feet* 6 *Inches*, or 38 $\frac{5}{10}$

PROB. IV. *To find the Content of a Sector of a Circle.*

The Rule. SEt 1 on the *Double line*, to the *Semidiameter* on the *Double line*, then againſt *half the Circuit of the Arch* on the *Double line*, is the *Content* on the other *Double line*. This needs no *Example*.

PROB. V. *How to meaſure the Segment of a Circle.*

A *Segment of a Circle*, is a ſtrait Line drawn thro' the *Circle*, but not thro' the *Center*, it divides a Circle into 2 *Parts* or *Segments* ; and the Leſſer is thus meaſured. Let the *Sector* be meaſured, whereof the *Segment* is part, then *ſubtract* the *Triangular Part*, the Remainder is the *Content of the* Segment : But to the *greater Segment*, the *Content* of the *Triangle* included is to be *added*.

CHAP. IV.

The Uſe of the Double-Scale ; *ſhewing how to meaſure all manner of Superficies, as Board, Glaſs, Painting, Plaiſtering, Wainſcoting, Tyleing, Paving,* &c. *by the* Sliding-Rule, *and Arithmetically.*

1. *In Meaſuring Boards.*

PROB. 1. Let there be a *Board* whoſe *Breadth* is 27 *Inches* $\frac{1}{2}$ or 27 ,$\frac{50}{100}$, and the *Length* 15 foot $\frac{1}{4}$ or 15 ,$\frac{25}{100}$, what is the *Content* by the *Sliding-Rule*.

Example.

Set 12 on the *Double Scale* B, to 27 $\frac{1}{2}$ on the *Double Scale* A, then againſt 15 *feet* $\frac{1}{4}$ on the *Double Scale* B, is 35 *feet*, the *Content* on the *Double Scale* A.

Decimally.

The Rule. Multiply the *length in feet* by the *breadth in Inches*, and cut off ſo many Figures from the Right-hand, as are *Decimals* in your *length* and *breadth*, the Remainder divided by 12, the *Quotient* is the feet and the *Remainder* (if any) the odd *Inches*.

Example. Length is —— *Feet* 15.25
Breadth is —— ——*Inches* 27.50
76250
10675
3050 F. In
12)4193750(34.11
36
059
The *Cont.* is 34 F. 11 *Inch*—.48
11 *Inches*

The *length* 15 *Feet* $\frac{1}{2}$, or ——*Feet* 15.25
Breadth 27 *In.* $\frac{1}{2}$, or 27.5 Inverted is—5.72
3050
1068
76
Product is 419 *In.* $\frac{4}{10}$ as before I*nches* 41.94

But if the *Breadth* be taken in *Foot-Meaſure*, it's done without *Diviſion* as follows.

F. Par
The length as before 15 Feet $\frac{1}{4}$, or—15.25
Breadth 27 *Inch.* $\frac{1}{2}$, or 2 F $\frac{29}{100}$ Inverted 92.2
3050
305
137
Content is 34 F. 11. *I.* as before, or F. 34.92

And by the Sliding-Rule it's thus: Set 1 on the *Double Scale* B, to 22.9 on the *Double*

ble Scale A; then againſt 15.25 on the *Double Scale* B, is almoſt 35 feet on the *Double Scale* A, the *Content* as before.

Or, by the *Rule of Practice*, when the *Length* is in *Feet* and *Inches*, and the *Breadth* alſo in the ſame, counting for 1 *Foot* in Breadth, the whole Length is the Content, and for the Inches, according to its Aliquot parts of a Foot or 12 Inches; as it follows, in the laſt *Example*.

A Board whoſe Length being 15 *Feet* 3 Inches, and Breadth 27 Inches ½ or 2 *Feet* 3 Inches ½.

F. Inc.
The Length ——— ——— ——— 15.03
Set it down again ——— ——— ——— 15.03
Divide by 4, becauſe 3 *In.* is ¼ of a *Foot* - 3.99¾
Div. the laſt by 6, bec. ½ *In.* is ⅙ of 3 *In.* 0.07¾

And altogether is the Cont. Req. - - 34.11½

In like manner the Examples following may be done, both by the *Foot-meaſure*, and by this *Rule of Practice*, which is worth the Learner's minding.

More Examples.

The Breadth 9 In.	Length 13 F.	Con. 9 F. ¾
The Breadth 21 In.	Length 19 F.	Con. 33 F. ¼
The Breadth 25 In.	Length 29½ F.	Con. 61 F. ½

PROB. II. *Another Way when the Dimentions are* Feet *and parts, and the Content is required in* Feet *and parts, by the* Sliding-Rule.

Let there be a *Board* whoſe *Length* is 24 *Feet* ¾, and the *Breadth* 1 *Foot* ½, what is the *Content?* *Example.*

Set 1 on the *Double Scale* B, to 1 ½ on the *Double Scale* A; then againſt 24 ¾ on the *Double Scale* B, is 37 *Feet* ⅒ on the *Double Scale* A, which is the *Content.*

More Examples.

Breadth	3¼ feet	Length	20 feet	65 feet
Breadth	7½ feet	Length	25 feet	187 feet ½
Breadth	12 feet	Length	30 feet	360 feet
Breadth	15 feet	Length	35 feet	525 feet

How to work this ſecond *Problem Decimally*, as is taught *Chap.* 2 *Prob.* 2.

Example F.Par.

Length ———————— 24.75
Breadth ———————— 1.50
123750
2 75
Cont. is 37 F. ⅛ or 8 *Inch* ½ or *Feet* 3 1250

And by *Contraction* thus, the ſaid *Example.*

F. Par.

Length 24 *feet* ¾, or ———————— 24.75
Breadth 1 Foot ½, or 1.5 *Inverted* is 5.1
2475
1237
The *Content* 37 *Feet* 1 *Inch* ½, or Feet 37.12

Ex-

Examples Decimally Contracted.

Breadth 4.27	Leng.06.21	$26\frac{51}{100}$ or 26f.6In
Breadth 8.46	Leng.11.32	$95\frac{77}{100}$ or 95f.9In
Breadth 12.54	Leng.15.35	$192\frac{48}{100}$ or 192f.5In$\frac{7}{8}$
Breadth 16.74	Leng.21.42	$358\frac{57}{100}$ or 358f,6In$\frac{7}{8}$

PROB. III. *Directions for the Meaſuring of moſt Sorts of Artificers Works, and firſt of Glaſiers Work, with the manner of taking their Dimenſions.*

THE beſt way to meaſure *Glaſiers Work* is by the *Sliding Rule*, and the *Dimenſions* are taken very exact, even to $\frac{1}{8}$ of an Inch; they commonly agree for their Work by the *Foot*, whether the *Glaſs* be *Old* or *New*, *Squares* or *Quarries*. *Note*, Saſh-Windows are *glazed* by the *Square*; that is, they tell how many *Squares* there be in all the *Lights*, and then reckon what they come to at ſo much the *Score*, or *Dozen*

PROB. IV.

Let there be a Pane of Glaſs $29\frac{1}{2}$ *Inches long, and* 7 *Inches broad; what is the Content?*

Example.

By the Sliding Rule. ſet 144 (repreſented by 1.44) on the Line B, to 7 *Inches* on the Line A, then againſt $29\frac{1}{2}$ on the Line B, is 1 *foot* and almoſt a half on the Line A, or *Decimally* 1 *foot* $\frac{44}{100}$

More Example.

Breadth $3\frac{1}{2}$ In	Length $20\frac{1}{4}$ In	49 parts, or 5 In $\frac{7}{8}$
Breadth $5\frac{1}{4}$ In	Length $25\frac{1}{2}$ In	92 parts, or 11 In $\frac{1}{4}$
Breadth $9\frac{3}{4}$ In	Length $30\frac{3}{4}$ In	2 feet 1 Inch $\frac{1}{4}$
Breadth $13\frac{1}{4}$ In	Length 35 inch	3 feet 2 Inch $\frac{3}{4}$

The foregoing Problem Arithmetically.

Multiply the *length* in *Inches* and *Parts* by the *breadth* in *Inches* and *Parts*, *and* from the Right hand of the *Product* cut off ſo many *Figures* as are *Decimals* in the *Length and Breadth* (if there be any) and the *Remainder* divide by 144, the *Quotient* is the *Feet*, and if any thing remain, divide it by 12, the *Quotient* is *Inches*.

Example.

	In.Par.
Length in *Inches* and *Parts* ——	29.5
Breadth in *Inches* and *Parts* ——	7.0

144)206.50(1.5
144
12)062(5 Inches
60

The *Content* is 1 Foot 5 *Inchbs* 02 and Remainder 2.

To *Perform* this *Decimally*, without *Diviſion*.

Take the Length and Breadth in Foot meaſure, and then it's thus ;

Ex.

Example. F.Par.

The *Length* 29 *Inches* ½, or ——— 2.46
The *Breadth* 7 *In.* or 0.58, *Inverted* is 85
1230
197
The Content is 1 Foot 5In.¼, or F*eet* 1.427

After the ſame manner may all the foregoing Examples be wrought.

PROB. V. *Directions for meaſuring* Joyners *and* Painters *Work*; *with the manner of taking their Dimenſions.*

Joyners and *Painters* W*ork*, are generally agreed for by the *Yard*, and therefore having caſt up their D*imenſions*, they bring the whole *Sum into Yards*, by dividing the *feet* by 9.

Now in taking the *Dimenſions* of *Joyners*, or P*ainters Work*, ſuch as P*ollection*, and *Beadwork*, you muſt by a Line girt the *Bends* and *Hollows*, and ſo bring it down to the Bottom, after which meaſure the length of the *line* by your *Rule*, ſetting it down for one of the *Dimenſions*, then meaſure the length of the former *height*, and ſet it down for a ſecond *Dimenſion*.

Note, That *Joyners Meaſure*, *Window-ſhuts*, and *Doors*, are W*ork* and *half*, becauſe they are workt on both ſides.

The *Painting* of *Windows* are generally agreed for by ſo much the *Light*, and *Caſements* at ſo much a *Caſement*.

In *Joyners* and *Painters Work*, Deductions are made for all *Windows*, and *Chimneys*.

Example.

A *Joyner* hath wainſcotted a *Room* 44 *feet* and a half in *Compaſs*, and 9 *feet three quarters* in *height*; what is the *Content* by the *Sliding-Rule*?

Set 1 on the *Double Scale* B, to 44 *feet* $\frac{1}{2}$ on the *Double Scale* A, then againſt 9 *feet three quarters* on the *Double Scale* B, is 433 *feet* $\frac{9}{10}$ on the *Double Scale* A, the *Content*: Or thus, ſet 9 on the *line* B, to 44 $\frac{1}{2}$ on the line A, then againſt $9\frac{3}{4}$ on the *line* B, is 48 Y*ards* on the *line* A, which is the *Content*.

Decimally. F.Par.

The Compaſs of the Room 44.50

The Height———— ——— 9.75

22250

31150

40050 yar.fee.In.

9)433.8750(48.01.0$\frac{1}{2}$

36

The *Content* is 48 Y*ards* 073

1 *Foot* 10 *Inches* $\frac{1}{2}$ 72

01

And by *Contraction*, the ſaid *Example* is thus,

	F. Par.
The Compaſs of the *Room*, 44 *feet* ½ is	44.5
The Height 9 *feet* ¾ or 9.75, Inverted is	57.9
	4005
	311
	22
The Product is	Feet 433.8
The F. Multiply'd by 0.111, Inv. is	111.0
	4338
	434
	43
The *Content* as before in *Yards* is	48.15

How to meaſure Painters-Work by the Sliding-Rule.

Example. There is a piece of *Painting* 13 feet ½ broad, and 23 ½ feet long. Set 9 on the *Double Scale* B, to 13 ½ on the *Double Scale* A, then againſt 23 ½ on the *Double Scale* B, is 35 Yards ¼ on the *Double Scale* A, which is the *Content* of ſuch a piece of *Painting*.

Decimally

Decimally.

F. Par.
Length 23 *Feet* ½ or —— 23,50
Breadth 13 *Feet* ½ or —— 13.50
1175000
7050
2350 var. fee In.
9)317.2500(35.2.3
27
047
Content is 35 Y*ards* 45
2 *Feet* 3 I*nches* 02 foot.

More Examples.

Breadth 4½ feet	Length 22 feet	11 Yds.
Breadth 15¼ feet	Length 19½ feet	33 Yds.
Breadth 10 feet	Length 30 feet	33 Yds 3/10
Breadth 19 feet	Length 29 feet	61 Yds. 1/4

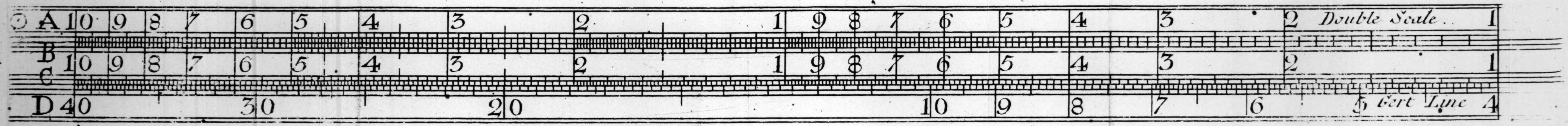
PROB. VI. *The meaſuring of* Plaiſterers *and* Painters*-Work by the* Sliding-Rule.

Example 1. *Of* Plaiſtering.

LET there be a *Cieling plaiſtered*, whoſe *length* is 25 *feet* 3 I*nches*, and the *breadth* 15 *feet* 6 I*nches* : Set 9 on the *double Scale* B, to 25 ¼ on the *double Scale* A; then againſt 15 ½ on the *double Scale* B, is 43 *Yards* and almoſt a *half* on the *double Scale* A, which is the *Content*.

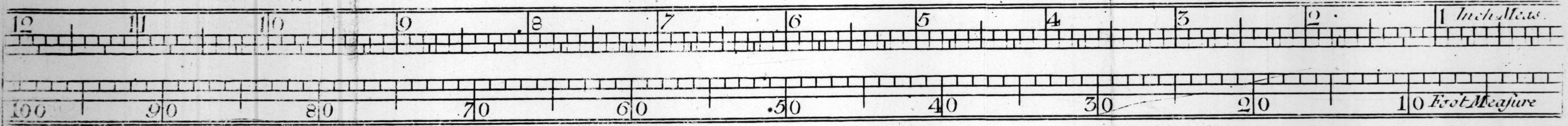
Example

Coggeſhall's Rule for Menſuration



A
B
C
D
1 0 9 8 7 6 5 4 3 2 1 9 8 7 6 5 4 3 2 Double Scale. 1
1 0 9 8 7 6 5 4 3 2 1 9 8 7 6 5 4 3 2 1
4 0 30 20 10 9 8 7 6 5 Gert Line 4

[illegible] and all other [illegible] are made by [illegible]
[illegible] in the Strand



12 11 10 9 8 7 6 5 4 3 2 1 Inch Meas.
100 90 80 70 60 50 40 30 20 10 Foot Meaſure

Example 2. *Of Paving*

Let there be a piece of *Paving* 34*Feet* $\frac{1}{2}$ long, and 12 *feet* $\frac{1}{2}$ broad; ſet 9 on B, or 34 $\frac{1}{2}$ on A, then againſt 12 $\frac{1}{2}$ on B, is 48 Yards almoſt the *Content*.

PROB. VII.

The meaſuring ſuch *Superficies* as are meaſured by the ſquare of 10 *feet* (*viz*. 100 *Feet* in a *Square*, for if you multiply 10 by 10 it makes 100) ſuch as *Flooring*, *Roofing*, *Partitioning*, *Tyleing*, &c.

By the Sliding Rule.

The *Rule*. Set 100, or 1 in the middle, to the length; againſt the breadth is the *Content*.

Example.

There is a *Floor* whoſe length is 61 *feet* and $\frac{1}{2}$. the *breadth* 14 *feet* and a *quarter*, ſet 100 on B, to 61 $\frac{1}{2}$ on A; then againſt 14 $\frac{1}{4}$ on the *Double Scale* B, is 8 *ſquare* $\frac{3}{4}$ on the *Double ſcale* A, for the *Content*, being 8 *Square* 75 *Feet*.

Decimally.

Multiply the *length* by the *breadth*, and from the *Product* cut off 2 more Decimals than is in the *length* and *breadth*, the *Figures* remaining are the *Squares*.

Example: F.Par.

Length 61 Feet ½ or in *Foot meaſure* 61.50
Breadth 14 Feet ¼ or in *Foot meaſure* 14.25

30750
12300
24600
6150

Content 8 *Squares* ¾ or 76 Feet 8.763750

By *Contraction* the ſame *Example* is thus,
Breadth 14 F. ¼ is in *Foot meaſure* Feet 14.25
Length 61 Feet ½, or 61.5, Inverted is 5.16

8550
142
71

Product (cutingoff 3 places is) *Squares* 8.763

More Examples.		*Contents.*
Length 42 feet	Breadth 24½ ft.	10 ſquares 29 feet
Length 64 feet	Breadth 29 ft.	18 ſquares 56 feet
Length 86 feet	Breadth 35½ ft.	30 ſquares 53 feet

Deductions in this Problem.

In *Carpenters Work*, you are to *deduct* for all *Well-holes* in your F*looring*, for all *Chimney-hearths*, and the like.

Alſo in P*artitioning*, *Deductions* muſt be made for all *Doors* and *Windows* that are meaſured in.

In *Roofing* make no *Deductions* for *Window-ſhafts*, or S*ky-Lights* becauſe they are more trouble to the *Workman* than the *Stuff* is worth that would cover them.

PROB.

PROB. V.

Having in the former Part of this Treatiſe ſhewed the Meaſuring of all manner of Superficies, likewiſe all ſorts of Regular Figures : I ſhall now give you ſome Inſtructions for the taking the Dimenſions *of* Trees, *or Round* Timber, *and ſo proceed to the Meaſuring of ſuch, and all manner of Solids.*

THE *Tree* being cut down, the Cuſtom is to *Gert* it, as is ſhewed in the beginning of the next *Chapter*, and for the *length* they account from the *But End*, up ſo far as the *Tree* will hold half a foot *Gert* when twice folded.

The *Dimenſions* being taking, the *Tree* is to be meaſured by *Chapter* the ſixth, as ſquare T*imber.*

If the T*ree* have great *Boughs* that will hold half a foot G*ert*, ſuch *Boughs* are called T*imber*, and they are meaſured and are added to the whole.

1. *Note*, if round, rough T*imber* be meaſured for *Sale* ; the common way among *Artificers* in allowing for Rind or Bark is thus: if the G*ert* or fourth part of the *Circumferenee* of the T*ree* be $\frac{50}{100}$ or half a foot, they allow $\frac{05}{100}$ or *half Inch half quarter*; if the 4th part of the *Circumference*

be a *foot*, they allow $1\frac{20}{00}$ or 1 *Inch* and almoſt a quarter; if 1 foot ½ *Gert* $1\frac{75}{00}$, or an *Inch* and above three quarters for the *Bark*, *&c.* But for *Beach*, *Elm*, *Aſh*, and ſuch that is thin Bark'd, then the *Allowance* muſt be a ſmall matter leſs.

2. I have ſeen great difference in the Gert of a *Tree* in the ſpace of two feet, or leſs, and that hath been generally where one or two *Arms* have been cut off: In ſuch a *Caſe* it is neceſſary to *Gert* the *Tree* twice or thrice, if there be any great *Difference*, or otherwiſe there will be loſs to the *Buyer* or *Seller*. Again, they ſay the *Buyer* hath Priviledge to Gert any where between the *middle and the Ground end*, if it be for his Advantage.

Laſtly, The *Content* of any piece of *Timber* being found in feet, if divided by 50, you have the *Content* in *Loads*: But ſome will have a *Load* to be 40 ſolid *feet*, therefore you may take which of the two is moſt cuſtomary with you. The reaſon why the Difference is, they ſay, becauſe it is ſuppoſed that 40 feet of round Timber, or 50 feet of hewn Timber, weigh about a *Tunn*, or twenty hundred Weight, which is commonly accounted a *Cart-load*.

CHAP.

CHAP. VI. *The Meaſuring of* Round Timber *the common way.*

TAKE the length in *feet*, *half feet*, (and if deſired) in *quarters*, then meaſure half way back again, where *Gert* the T*ree* with a ſmall *Chord* or *Chalk line*: Double this line twice very even. This fourth part of the *Gert* or *Circumference* (I call the *Gert*) meaſure in *Inches*, *Halves*, and *Quarters* of *Inches*; but be ſure the Length be given in feet, *&c.* and the ſide of the *Square* or *Gert* in *Inches*.

So you have always three *Numbers* given, to find the fourth, *viz.* 12 on the *Gert line* for the firſt, the length in *feet* always for the ſecond, and the *Gert* or ſide of the *Square* for the third, in *Inches*, *Halves* and *Quarters*.

Now we come to the *Rule*, Set 12 on the G*ert-line* D, to the *length* (in *feet*, *&c.*) on the D*ouble-Scale* C, then againſt the ſide of the *Square* on the G*ert-line* D, in *Inches*, *Halves* and *Quarters*) you will find, on the D*ouble-Scale* C, the Content.

Note, This Rule is General.

Ex. 1. Suppoſe the G*ert* of a *Tree* in the middle be 64 *Inches*, and the *length* 31 *feet* what is the *Content*? Set 12 on the G*ert-line* D, to 31 *feet* on the *Double-Scale* C;

then againſt 16, the one fourth of 64, on the *Gert line* D, is 55 *feet*, the *Content* on the *Double-ſcale* C.

2. A. Piece of T*imber* is 15 *feet Long*, and one fourth of the *Gert* 42 *Inches*: Set 12 on the *Gert-line* D, to 15 on the ſecond length of the *Double-ſcale* C; then againſt 42 at the beginning of the *Gert-line* D, is on the *Double-ſcale* C, 184 *feet* the *Content*, Reckoning the firſt 1 at the beginning of the line of *Numbers* (or *Double-ſcale*) to be 100, the 8 *Grand Diviſions* 80, the *two ſmall ones* 4; ſo accounting all together makes (as I ſaid before) 184 *feet*.

3. A *length* is 9 *feet three quarters*, and one fourth of the *Gert* 39 *Inches*, ſet 12 on the *Gert-line* D to $9\frac{3}{4}$ on the line of Numbers C, and againſt 39 at the beginning of the *Gert-line* D, is 103 feet the *Content* on the *Double-ſcale* of Numbers C.

4. The *Length* 9 *Inches*; the quarter of the *Gert* is 35 *Inches*. Now becauſe the *length* being not one *foot*, meaſure it by your line of *Foot-meaſure*; and ſee what part of a *foot* it makes, a *foot* ſuppoſed to be divided into a *hundred parts*: Or do thus, ſet 12 on the *Double-ſcale* B, to 100 on the *Double-ſcale* A, then againſt the *length in Inches*, namely, 9 on the *Double-line* B, is 75 on the *Double-ſcale* A, for the *Deci-*

mal or part of a *Foot* : Then ſet 12 on the *Gert-line* D, to 75 in the firſt length of the *Double-ſcale* C, then againſt 35 on the *Gert line* D, is 6 feet $\frac{4}{10}$, or almoſt half a Foot on the *Double-ſcale* C, for the *Content.*

5. A *Rail* is 16 feet long, the quarter of the *Gert* 3 *Inches* ; ſet 12 on the *Gert-line* D, to 16 on the firſt length of the *Double ſcale* C, then againſt 30 (now called 3,) on the *Gert-line* D, is juſt 1 *foot* the *Content*, on the *Double-line* C.

More Examples

One fourth of the Gert or ſide of the Square in theſe Examples is	The leng. in feet.	The Content in feet and parts are
11 Inches	40$\frac{1}{2}$	34 feet
16 Inches	39$\frac{1}{2}$	70 feet $\frac{2}{10}$
14 Inch. $\frac{1}{4}$	50	68 feet
21 Inches	48	147 feet $\frac{2}{10}$
8 Inch. $\frac{3}{4}$	36$\frac{1}{2}$	19 feet $\frac{4}{10}$
31 Inches	24	160 feet

In taking all the Dimenſions in *Foot-meaſure*, it's performed by the *Sliding Rule* ſooner then by *Inches* : thus count 10, 20, 30, 40, *&c.* on the *Gert line* to be 1, 2, 3, 4, *&c.* in Foot meaſure, and then place 10 on the *Gert line* D, to the Length of the Tree, on the *Double line* C; and againſt the *Gert* in *Foot meaſure* on the *Gert line* D, ſtandeth the *Content* on the *Double line* C.

1. *Example* before mentioned. A Tree in Length 31 *Feet*, and *Gerts* 64 *Inches* or *Feet* 5 $\frac{32}{100}$ it's fourth is *Foot* 1 $\frac{30}{100}$, what's the *Content* ?

Set 10 on the *Gert-line* D, to 31 Feet on the *Double line* C; then againſt 1 *Foot 33 parts*, on the *Gert-line* C, is 55 *feet* on the *Double-line* C, which is the *Content* as before.

2. A Piece of Timber 15 *feet long*, and one fourth of the *Gert* 42 *Inches* or *feet* 3 $\frac{5}{10}$, what's the *Content*,

Set 10 on the *Gert-line* D, to 15 on the firſt part of the *Double-line* C; then againſt 3 *feet* 5 *Tenths*, on the *Gert line* D, is 184 *feet* on the *Double-line* C, the *Content* Requir'd. Again,

3. A *Length* is 9 *feet* $\frac{3}{4}$ or 9 *feet* , $\frac{75}{100}$, and one fourth of the *Gert* 39 *Inches*, or 3 *feet* $\frac{35}{100}$: Set 10 on the *Gert-line*, to 9 , $\frac{75}{100}$ on the *Double-line* C; and againſt 3 $\frac{25}{100}$ on the *Gert line* D, is beyond 100 on the *Double-line* C: In ſuch Caſes take half the Length, and then the *Content* muſt be doubled. As here,

Set 10 on the *Gert-line*, (to the half of 9 $\frac{75}{100}$) 4 $\frac{87}{100}$; and then againſt 3 $\frac{25}{100}$ is 51 $\frac{5}{10}$, the double is 103 *feet*, the *Content* requir'd.

4. The *Length* 9 *Inches* or $\frac{75}{100}$ of a Foot the quarter of the *Gert* 35 Inches or 2 *feet* $\frac{92}{100}$ ſet 10 on the *Gert-line*, to $\frac{75}{100}$ in the *Double-line* C, and againſt 2 *feet* , $\frac{92}{100}$ in the *Gert-line*, is 6 *feet* $\frac{4}{10}$ on the *Double-line* C, the *Content* Requir'd. Again,

5. A *Rail* 16 *feet* long, the quarter of the *Gert* 3 *Inches*, or ,$\frac{25}{100}$ of a *Foot*, what's the *Content* ?

Set 10 on the *Girt line*, to 16 in the *Double-line*, then againſt ,$\frac{25}{100}$ in the *Gert-line*, is 1 *Foot* the *Content* on the *Double-line* C.

And in like manner may all the *Examples* aforegoing, be wrought by the *Sliding-Rule*, if you take the fourth of the *Gert* in *Foot-meaſure*; for 11 *Inches* count ,$\frac{92}{100}$, for 16 *Inches* count 1 ,$\frac{33}{100}$, for 14 *Inches* count 1 ,$\frac{17}{100}$, for 21 *Inches* count 1 ,$\frac{75}{100}$, for 8 *Inches* $\frac{3}{4}$ count ,$\frac{73}{100}$, and for 31 *Inches* count 2 ,$\frac{58}{100}$, and ſo for the length 40 *feet* $_2$ is 40 $\frac{5}{10}$, and ſo on for any other, which may be ſeen by the Table of *Foot-meaſure*, or by the Line of *Foot meaſure* on the *Sliding-Rule*.

If it be required to find the *Content* of any piece of Timber in *Loads*, at 40 feet the *Load*, uſe half the *Gert* inſtead of the whole.

Example.

A Length is 15 *feet*, and a Quarter of the *Gert* is 42 *Inches*; ſet 12 on the *Gert-line* D, to 15 on the firſt length of the *Double-Scale* C, then againſt 21, (which is half of 42 one quarter of the) *Gert* on the *Gert-line* D, is 46 on the *Double Scale* C, whereof 4 is 4 *Loads*, and the 6 multiplied by 4, makes 24 *feet*, which is 4 Load 24 *feet*, or 4 Load ,$\frac{6}{10}$.

If at any time you have the *Content* in Loads, and you would have it in *Feet*; 'tis but multiplying the *Content* found in *Loads* by 4, the *Square* of 2, by which you divided your *Gert*. So 46 multiplied by 4, is 184 *feet*.

If you take the Dimenſions in *Foot-meaſure*, you may find the Loads contained in any Timber, thus. If a length be 15 *Feet*, and quarter of the *Gert* 42 *Inches*, that is 3 *Feet* ,$\frac{5}{10}$ whoſe half is 1 Foot ,$\frac{75}{100}$, Then ſet 10 on the *Gert line* D, to the Length 15 on the *Double line* C, then againſt 1 ,$\frac{75}{100}$ (the half of 3,$\frac{5}{10}$ one quarter of the *Gert*) on the *Gert-line* is 4,$\frac{6}{10}$ on the Double line C, which is 4 *Loads* ,$\frac{6}{10}$ or 4 *Load* 24 *Feet* the *Content* required.

If at any time you would know the *Content* of any piece of Timber by *Natural Arithmetick*; having Gert your Tree, and taking one fourth part for the ſide of the *Square*, obſerve the following *Rule*.

Multiply the length of the ſide of the *Square* in *Inches* into it ſelf, and the *Product* divide by 144, the *Quotient* is the *Content* in *feet*, and if any thing remain, divide again by 12, the *Quotient* is the odd *Inches*.

So

So in Example the ſecond.

A piece of *Timber* is 15 *feet* long, the quarter of the *Gert* is 42 *Inches*, what is the *Content* of the *Tree* ?

The ſide of the *Square* ——— 42 Inches
Multiplied by it ſelf ——— 42
84
168
The *Product* is *Inches* —— 1764
Multiplied by the *length* —— 15 feet.
8820
1764 feet.Inch.
144)26460(183.9
144
1206
1152
00540
432
12)108(9 Inches
108

Content is 183 *Feet* 9 *In.* 000

But by *Decimal Arithmetick*, taking all the Dimenſions in *Foot-meaſure*, it's much ſhorter, as follows by the foreſaid *Example*,

Side

F. Par.
Side of the Square 42 *I* in *Foot-meaſure* 3.5
Multiply it by it ſelf ——— ——— 3.5
175
105
The *Product* is ——— - ——— *Feet* 12.25
Multiply it by it's Length— *Feet* —15
6125
1225
Laſt *Product* is the *Cont.* in *Feet*—183.75
That is 183 *Feet* $\frac{75}{100}$ or 9 *Inches* as before

CHAP. VII.

Of the Meaſuring of Round Timber *or* Trees, *the True Way, by the* Sliding-Rule *and* Arithmetically.

THE laſt way being the common way of *Meaſuring Round Timber*, but it giveth not the true *Content* but is always too little (though it be generally uſed: I ſhall now give you a point on the R*ule*, which muſt be uſed inſtead of 12; which point you may cut with a ſharp pointed Penknife at 10.635, but much better by the *Inſtrument-Maker*.

So *in the ſecond Example foregoing.*

Let the Length be 15 feet, the one fourth of the *Gert* is 42 *Inches*: Set the ſaid point (which is 10.635 the true point) to 15 the

Length, then againſt 42, at the beginning of the *Gert-line*, is 233 *feet* on the *Double·ſcale* for the *Content*; whereas the common way giveth but 184 *feet*.

Note, That the *common Meaſure* is to the *true Meaſure*, as 11 is to 14; ſo that if you ſet 11 on the *Double·ſcale* to the *Content* found the *common way*, 14 ſhall point out the true *Content* of the ſame; and if you ſet 14 to any true *Content*, 11 ſhall point out the *Content* the *common way*; this is done on the *Double Line*.

The G*ert* being taken in F*oot·meaſure*, the *Point* for True Meaſuring is 8862 or $\frac{8862}{10000}$ or more briefly ,$\frac{89}{100}$. and then for the foregoing *Example*.

The Length being 15 *feet*, the one fourth of the G*ert* 42 *Inches*; that is, 3 *feet* $\frac{5}{10}$. or *feet* 3.5 T*enths*, I demand the true *Content*.

Set the aforeſaid Point ,$\frac{89}{100}$ on the G*ert line* D, to the Length 15 *Feet* on the *Double*-L*ine* C, (in it's firſt part or beginning); then againſt *feet* 3.5 T*enths* (which is 35) on the G*ert line* D, is 233 *feet* on the *Double-line* C, which is the true *Content* Requir'd. Again,

Suppoſe a *Round Tree* in Length 31 *feet* and one Quarter of its *Gert* 16 *Inches*, that is 1 *Foot* ,$\frac{33}{100}$, or *Foot* 1.33 Parts; what's the true *Content*.

Set 89 en the *Gert-line* D, to 31 *Feet* on the *Double-line* C, then 1.33 on the *Gert-line* D, points to 70 *Feet* on the *Double-line* C, the true *Content* required; whereas by the 1*ſt Example* of *Chapter* the 6*th*, the *Content* of this *Tree* is but 55 *Feet*, by the common way of Meaſuring, which is no leſs than 16 *Feet* ſhort of Truth.

I ſhall next ſhew how to find the true *Content* of *Timber*, *Arithmetically*, as followeth.

By a *Fixed-Number* or *Decimal*, .2821, which multiply by the *Gert* of the *Tree*, taken in *Inches*, and from the *Product* cut off four Figures to the Right-hand, there maining to the Left-hand, are the *Inches* for the ſide of the *Square* equal to the *Gert* or *Circumference* of the *Tree*.

And for underſtanding it, take theſe two or three *Examples*, how to find the ſide of the *Square* that ſhall be equal to the *Gert* or *Circumference* of the *Tree*, by this *Fixt Number* 2821, always to be uſed; when the *Gert* is *Inches*.

This *Decimal*, or *Fixt Number* is .2821
The *Gert* in the 2d *Example* is-- 168 *Inch.*

22568
16926
2821

The *Product* is —— *Inches* 47.3928

Here the ſide of a *Square* equal to that *Gert* is 47 *Inches* and a *quarter*; for theſe four *Decimals* cut off, are ſo many parts of 10000, and .3928 is almoſt $\frac{4}{10}$ of a Foot, which is more then a *Quarter of an Inch*.

Another Example.

The *Fixt Number* is ——— .2821
The *Gert* is —— ——— —— 48 *Inches*

22508
The ſide of a *Square* equal 11284
to this *Gert* is 13 ½ *In.* or *In* 13.5408

Another Example.

The *Fixt Number* is ——— .2821
The *Gert* is ——— ——— —— 54 *Inches*

11284
The ſide of a *Square* equal 14105
to this *Gert* is 15 *In.* ¾ or *In.* 15 2334

I now proceed to work the foregoing *Piece of Timber* or *Tree*.

Arithmetically.

Multiply the *Inches* of the Square (with the firſt Left-hand Figure of the four which is cut off) into it ſelf, and that *Product* by the *Length in Feet*, and divided the laſt *Product* by 144, the *Quotient* is *Feet*, and the *Remainder*, if any, divide by 12, the *Quotient* is *Inches*.

Example. F. Par.

The ſide of the *Square* in *Inches* 47.3
Multiply by it ſelf — — —— 47.3
1419
3311
1892
In the *Product* cut off 2 *Dec*. -- 2237.29 P.
The Length in *Feet* — —— 15
11185
2237 F. I.
144)33555(233.3
288..
0475
432
4035
The *Content* of this 432
Timber is 233 *Feet* 3 *Inches* — 003 *Inches*

Another Example for Practice.

There is a *Round Tree* whoſe *Gert* is 48 *Inches* and the *Length* 8 *Feet* 9 *Inches*, what is the *Content*?

Multiply the Inches of the ſide of the *Square* equal to the *Gert* (with the firſt *Figure* on the Left-hand of the four cut off) into it ſelf, and from the *Product* cut off two Figures to the Right-hand, the Remainder multiply by the *Inches* of the *Length* of the *Tree* (and not by the *Length* in *Feet*) becauſe the *Length* is *Feet* and *Inches*, therefore you muſt bring your *Length* into *Inches* by multiplying them by 12, this laſt *Product* divide by the *Inches* that are in a *ſquare foot of Timber*, namely 1728, the *Quotient is the Feet*, the Remainder (if any) divide by 144, the *Quotient* is the odd *Inches*.

Example.

The Side of the *Square* being *Inches* 13.5
Multiply by it ſelf ——— ——— 13.5
F. In 675
The Length —— 8.9 405
Multiplied by ——— 12. 135
makes ——— ——— 105 *Inches*. 182.25
The Length in *Inches* is —— 105 *In.*
910
1820
The *Content* of this 1728)19110(11 F.
Round-Tree is 11 *Feet* 1728.
And 102 Remains, which 01830
is not one *Inch*. 1728
0102

Note. The *Fix'd Number* 2821 is the ſide of a *ſquare*, that's equal to a *Circle* whoſe *Gert* is 1 *Inch*, or 1 *Foot*, or 1 any *Thing*.

Alſo the *Number* 10.635 is the ſide of a Square, that's equal to a *Circle* whoſe *Diamter* is 12 *Inches*.

Alſo .8862 (more ſhorter .89) is the ſide of a Square, that's equal to a *Circle* whoſe *Diameter* is 1 Foot, or 1 any Thing.

Now to perform this Arithmetically, when all the Dimenſions are taken in Footmeaſure.

The *Rule.* Multiply the whole *Gert* by the *Fix'd-Number* .2821, and the Product is the Side of a Square equal to that *Gert*; Then multiply that Product by it Self, and this laſt Product multiply by the Length of the *Trre*, and it produceth the Content Required.

Example. Let the *Length* be 15 *Feet*, and the *Gert* 14 *Feet*. I demand the true *Content*?

The *Fix'd Number* is———	.2821
Multiply by the *Gert* 14 *Feet*, Inverted is	.41
	2821
	1128
The *Product* is the ſide of the *Sq.Ft.*	3.949
Multiply by ſelf Inverted is ———	949.3
	11847
	3546
	156
	27
The Product is the Square—*Feet*	15.576
Multiply by the *Length* 15 *Feet.* inverted	51
	15576
	7785
The *Product* is the *Content* — *Feet*.	233.51

That is 233 *Feet* $\frac{51}{100}$ or 233 *Feet* 6 *Inches*.

Another

Another Example for Practice.

A Round Tree, whoſe *Gert* is 48 Inches, or 4 Feet, and Lengt. 8 *Ft.9 In* or 8 *feet* $\frac{75}{100}$
The *Fix'd Number* is ——— ——— —— .282
Multiply by the Gert 4 Feet ——— —4
Produ&#x0063;t is the *Square* ſide — *Foot* 1.128
Multiply by it Self, Inverted is——821.1
1128
112
22
8
The Product is the Square——*Foot* 1.270
Multiply by the *Length* 8.75, *Invert.* is 57.8
10160
889
60
The Product is the *Content* — *Feet* 11.109

CHAP VIII.

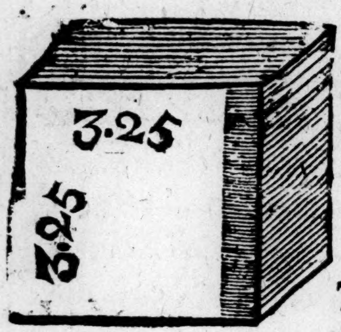
To meaſure the CUBE.

LET there be a Cube whoſe ſides are 3 *Feet* 3 *Inches*, what is the *Content*?

By the Sliding Rule.

Set 12 on the *Gert-line* D, to 3 $\frac{1}{4}$ on the *Double-ſcale* C; then againſt 39 Inches the ſide of the Cube on the *Gert-line D*, is 34 *Feet* and $\frac{1}{4}$ on the *Double-ſcale* C, the *Content* Required.

Decimally



F.Par.
The ſide 3 F. 3 I. or 3.25
Mult. by the ſame 3.25
1625
650
975
The 1ſt *Produ*-is 10.5625
Mul.by the ſame 3.25
528125
211250
316875
The *Content* is 34 *Feet* $\frac{1}{3}$ or *Feet* 34.328125

But by Contraction thus

F.Par.
The ſide of the *Cube* 3 Feet 3 *In.* or 3.25
Multiply by 3 F. 25 *parts*, *Invert.* is 52.3
975
65
16
The firſt *Prod.* call'd the *Square*, is F. 1056
Multiply by 3 F. 25 *parts*, *Invert.* is 52.3
3168
211
53
The *Content* 34 *Feet* $\frac{1}{3}$ as before, F. 34.32

CHAP. IX.

To meaſure Timber *that is neither* Round, *nor Square; But firſt to find a mean Proportional between any two Numbers.*

TO find this *mean Proportional*, ſet the greater of the two Numbers on the *Gert-line*, to the ſame on the *Double-line* of Numbers; then again, the Leſſer on the *Double-line* of Numbers, is the *mean Proportional* on the *Gert-line*; or ſet the leſſer on the *Gert-line*, to the ſame on the *Double-line* of Numbers; then againſt the greater on the *Double-line* of Numbers, is the *mean Proportional* on the *Gert-line*; any one of theſe will do.

Note. Examples of this are in the next *Problem*.

PROB. I.

To meaſure unequal Squared Timber, *that is, the Breadth and Depth are not Equal.*

Meaſure the Length of the Piece in *Feet* and the *Breadth* and *Depth*, (at the end) in *Inches*, Then find the *mean Proportional* between the *Breadth* and *Depth* of the Piece as is taught (in *Chap*. 9, and) in the Example following, The *mean Propotional* is the ſide of a *Square* equal to the end of the Piece; which having found the Piece may be meaſured as *Square-Timber*.

Example I.

In a Piece of Timber whoſe Length is 13 Feet, the Breadth 23 Inches, and the Depth 13 Inches; Set 23 on the *Gert-line* D, to 23 on the *Double-ſcale* C; then againſt 13 on the Line C, is 17.35, or $17\frac{1}{3}$ on the *Gert-line* D, then ſetting 12 on the *Gert-line* D, to 13 Feet the *length* on the Line of Numbers C, then againſt $17\frac{1}{3}$ (the *Mean-proportion*) on the *Gert-line* D, is 27 Feet the Content Required.

Example II.

In Stone, which let it be 7 Feet 40 parts, or 7 *Feet* and about 5 *Inches* in *Length*, and 30 *Inches* in *Breadth*, and 23 $\frac{1}{2}$ *Deep*; ſet 30 Inches on the *Gert line* D, to 30 on the *Double-ſcale* C; then againſt 23 $\frac{1}{2}$, on the *Line of Numbers* C, is 26 $\frac{1}{2}$, or 26.50, on the *Gert-line* D: Then ſet 12 on the *Gert-line* D, to 7.40. on the Line C, then againſt 26 $\frac{1}{2}$ on the *Gert-line* D, is 36 Feet the Content on the *Double-ſcale* C.

The Content of theſe two Examples by Arithmetick, is thus,

The Firſt Example.

Let there be a Piece of Timber whoſe *Length* is 13 *Feet*, the *Breadth* 23 *Inches*, and the *Depth* 13 *Inches*.

The Rule.

Multiply the *Breadth* in *Inches*, by the *Depth* in *Inches*; and that *Product* multiply by the *Length* in *Feet*, and divide the laſt Product by 144, the Quotient is Feet, and the Remainder (if any) divide by 12, the Quotient is Inches.

Example.

The Breadth 23 Inches.
The *Depth* 13 Inches.
69
23 *Note*, This Example
The *Product* 299 by the *Sliding Rule*
Multiply by 13 *Feet* was 27 Feet by
897 *Arithmetick* it wants
299 1 *Inch*; for it is 26
144)3887(26 F. *Feet* 11 *Inches*
288
1007
864
12)143(11 Inches.
12
023
12
11 *Remainder* is $\frac{11}{12}$ of an *Inch*

By Foot meaſure it's done thus,

F.Par.
Breadth 23 *Inches* in F*oot-meaſure* is 1.92
Depth 13 *In.* or F*eet* 1.08 I*nverted* is 80.1
1.92
15
The Product is ——— ——F*eet* 2.07
Multiply by the *Lengt.* 13 F. I*nvert.* is31
207
62
Content is 26 Feet 11 *Inches*, or *Feet* 26.9

The Second Example, Decimally.

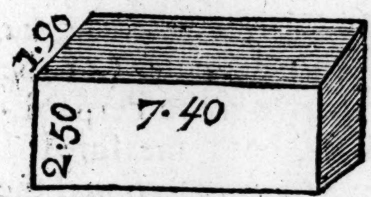
Let there be a piece of *Stone* 7 *Feet* 40 *parts* long, 2 *Feet* 50 *parts* in Breadth, and 1 *foot* 96 *parts* in Depth, what is the *Content*?

The Rule.

Multiply the Length by the Breadth, and the *Product* by the *Depth* or Thickneſs; and cut off from the laſt P*roduct*, as many places to the *Left hand* as there be *Decimals* in the three Dimenſions, the Integers remaining are Feet.

Example.

F.Par
The *Length* ——— ——— ——— 7.40
The *Breadth* ——— ——— ——— 2.50
37000
1480
The*Prod.*F.18.5000
The*Depth* F.1.96
1110000
1665
185



The*Content* is 36 F. 3. I. or *feet* 36.260000

By Foot *Meaſure it's thus Contracted.*

F.Par.
The Stones *Length* 7 *feet* 5 *In.* that is 7.41
Stones *Breadth* 30 I. or 2.5, *Invert.* is 5.2
1482
370
The Product is ——— ——— *feet* 1852
Depth 23 *Inches* ½ or 1.96, *Invert.* is 69.1
1852
1667
111
The*Content* is 36 *feet* 4 *Inch.* or *feet* 36.30

PROB.

PROB. II.

To find the Content of a Piece of Timber whoſe End is in the Form of a Triangle; and both Ends alike Equal.

TO find the *Content* of ſuch *Timber*, firſt find a *Mean proportion* between the Baſe and half the Perpendicular (of the Triangular End) or between the Perpendicular and half the Baſe, both meaſured in Inches. Then is the *Mean proportional* the ſide of a Square equal to the Triangle.

Then to find the Content, ſet 12 on the *Gert-line* D, to the Length in Feet on the *Line of Numbers* C, then againſt the *Mean-proportion* on the Gert-line D, is the Content on the *Line of Numbers* C.

But the Dimenſions being all taken in *Foot-meaſure*, and the Mean-proportional found in the ſame; then ſet 1 on the *Gert-line* D, to the Length in the Double-line C; then againſt the Mean-proportional in the *Gert-line* D, is the *Content* in the Double-line C.

Note If the two ſides of a Triangle be equal, the other ſide is called the Baſe, but if the three ſides be unequal, the longeſt ſide is the Baſe: From whence the neareſt Diſtance, to the oppoſite Angle, is the Perpendicular.

Examp.

Exam. A piece of Timber 19 *feet* 6 *inches* in *Length*, the *Baſe* of the *Triangle* at each End being 21 *Inches*, and the *Perpendicular* to each *Baſe* being 16 *Inch.* what's the *Cont.*

Set 21 Inches on the *Gert-line* D, to 21 on the Double-line C; then againſt 8 on the Line C, is 12 $\frac{7}{8}$ or 12.95 on the *Gert-line* D, the Mean-proportional.

Then ſet 12 on the Gert-line D, to 19 *Feet* ½ the *Length* on the Double-line C; and againſt 12.95 (the *Mean-proportional*) on the *Gert-line* D, is 22¾ (or *feet* 22 . $^{8}_{0}$ the *Content* Required) on the Double-line C. Or thus, Take all the Dimenſions in *Foot-Meaſure*; and then the *Length* 19 *Feet* 6 *Inches* is 19.5, the *Baſe* 21 *Inches* is 1.75, and the Perpendicular 16 Inches is 1.33; Now ſet 1.75 on the Gert-line D, to 1.75 on the Double-line C, and againſt 0.67 on the Double-line C, is 1.08 (on the Gert-line *D*) for the *Mean-proportional*: Then ſet 1 on the Gert-line D, to the Length 19.5 on the *Double-line* C, and againſt 1.08 on the Gert-line D, is 22.8 (or *Feet* 22 almoſt 11 *Inches*) on the *Double-line* C, for the *Content*, very near to that before.

Arithmetically.

The Rule; multiply the *Baſe* by the *Perpendicular* (both taken in *Foot meaſure*) and half that Product multiply'd by the

Length, produceth the *Content* Required, as in the foreſaid *Example*.

F. Par.
The *Baſe* 21 *In*, or in *Foot meaſure* is 1.75
The *Perpendicular* 16 *In*. or 1.33 *Inv*. is 33.1
175
53
5

The Product is ———— ———— Feet 3.33
Half the Product is ——— —— *Feet* 1.17
The *Length* 19 F. 6 I. 19.5, *Inv*. is 591
117
105
6

The *Cont*. is 22 F*eet* 10 *Inches* or F. 228

PROB III. *To Meaſure Timber that Tapereth*

THE Length meaſured in F*eet*, and note one third of the Length, which may be found by the *Sliding-Rule* thus; Set 3 on the D*ouble-line* A, to the Length on the D*ouble-line* B, then againſt 1 on the *Double-line* A, is the third part on the D*ouble-line* B; then if the *S*olid be round, Meaſure the *Diameter* at each end in I*nches*, ſubtracting the leſſer D*iameter* from the greater, and add half the Difference to the leſſer D*iameter*, the Sum is the *Diameter* in the middle of the *Piece*; then ſet 13.54 on the *Gert-line* D, to the length on the *Double Line* C, then againſt the *Diameter* in the middle on the *Gert-line* D, is a fourth Number on the *Double line* C, then ſet 13.54 or 13$\frac{1}{2}$ of the *Gert-line* D, to the thirdpart of the length on the Double-line C; then againſt the half Difference on the *Gert-line* D, is another fourth Number, on the *Double Line* C, theſe two fourth Numbers added together makes the *Content*.

Example. Let the *Length* be 27 *Feet* (the one third by the Rule is 9) the greater *Diameter* 22 *Inches*, and the leſſer 18 *Inches*.

See the Operation.

The greater *Diameter* ———— 22 *Inches*
The leſſer *Diameter* ———— 18 *Inches*

The *Sum* is ———— 40

The *Difference* ———— 04

The $\frac{1}{2}$ *Difference* ———— 02 } added
The leſſer *Diameter* ———— 18 }

The *Diameter* in the Middle 20 *Inches*.

Then ſet 13.54, or 13 $\frac{1}{2}$ on the *Gert-line* D, to 27 on the *Double-line* C; then againſt 20 on the *Gert-line* D, is 58.900, that is 58 *Feet* $\frac{900}{1000}$ parts.

Again, ſet 13.54 of the *Gert line* D, to 9 on the *Double line* C; then againſt 2 on the *Gert-line* (repreſented by 20) is 196 parts of a foot.

The firſt fourth Number—58. 900 } added
The ſecond fourth Number —196 }
The Sum is the *Content* —59.096
Which is 59 *Feet* ¼ *Inch.*

Note, If the Timber be Wainy, that is neither Square nor Round, take one Wain in and leave the other out.

The ſame done by *Foot-meaſure.*

F. Par
The Greater *Diameter* 22 *Inches* or 1.83
The Leſſer *Diameter* 18 *Inches* or 1.5
The Sum of both *Diameters* is *Feet* 2.33
Half is the middle *Diameter* — *Foot* 1.67
Difference of the *Diameter* is *Foot* 0.13
½ Difference of the *Diameter* is *Feet* 0.17

Then ſet 1.13 on the *Gert-line D*, to the *Length* 27 *feet* on the *Double-line* C; and then againſt 1.67 on the *Gert-line* D, is 58 *feet* $\frac{9}{10}$. Then,

Set 1.13 on the *Gert-line* D, to 9 *feet*, on the *Double-line* C; and then againſt 0.17 on the *Gert-line* D, is .196 Parts of a *Foot*, and both put together is the *Content*; that is, 58.9 and .196 added makes 59.096. or 59 *Feet* ¼ *Inch*, as before.

Suppoſe the Solid be Square, and having the ſame *Dimenſions*; that is *Length*, 27 *Feet*, the greater End 22 *Inches Square*, and the leſſer-End 18 *Inches Square*, what's the *Content*? F. Par.

		F.Par.
The *greater Square*	22 — In. or —	1·83
The *leſſer Square*	18 — In. or —	1.5
Sum of both *ſquares*	40 — In. or —	3·33
Half is the *mid. ſqu.*	20 — In. or —	1.67
Difference of the Ends	4 — In. or —	0.33
Half *Diff. of the Ends*	2 — In, or —	0.167

Then to find the Content by the Inch-meaſure it's thus. Set 12 on the Gert-line D, to 27 Feet (the Length of the *Solid*) on the Double-line C; then againſt 20 Inches (the *Middle ſquare*) on the *Gert-line* D, is 75 *Feet* $\frac{4}{10}$. Again ſet 12 on the *Gert line* to 9 *Feet* (one third of the *Length*) on the Double-line; and againſt 2 *Inches* (the half *Difference* of the *Ends*) on the *Gert-line*, is $\frac{25}{100}$ parts of a F*oot*; both together is 75 $\frac{65}{100}$ parts (which is almoſt 8 Inches) the Content of the Solid: Or thus, by Foot-meaſure.

Set 1 on the *Gert-line*, to the Length 27 Feet on the Double-line, then againſt 1 F*oot* 67 *parts* the (*Middle-ſquare*) on the Gert-line, ſtands 75 *Feet* $\frac{4}{10}$, and ſetting 1 on the Gert-line, to 9 *Feet* (the one *Third* of the *Length*, on the Double-line; then againſt 0·167 (the half Difference of the Ends) on the *Gert line*, is (on the Double-line) $\frac{25}{100}$ parts of a F*oot*, and both together 75 *feet* $\frac{4}{10}$ and $\frac{25}{100}$ is 75 *feet* $\frac{65}{100}$ Parts of a *foot*, as before, exactly agreeing both by *Inch meaſure* and *Foot meaſure*; and here note the numbers that are fix'd in this kind are thus to be underſtood: 13.54057, *&c.* in ſhort 13.54 is the *Diameter* of a *Circle*, whoſe *Area* or *Content* is 144 *Square Inches*: And 1,1283814, &c. in ſhort 1.13 is the Diameter of a *Circle* whoſe *Area* or *Content* is 1 foot, or 1 any Thing.

PROB. IV.

To find how many Inches in length will make a Foot Soild, *at any Gert being the Side of a Square, not exceeding* 40 *Inches.*

LET the *Gert* or ſide of the *Square*, upon the *Gert-line* be ſet to 1 on the *Numbers*. then againſt 41.57 of the *Gert-line*, is the mumber of *Inches* on the *Numbers* that will make a Solid *Foot*.

Example.

Let the Side of a Square be 7 *Inches*, ſet 7 on the *Gert-line* D, to 1 on the *Double line* C, then againſt 41.57 on the *Gert-line* D, is 35 *Inches* $\frac{1}{4}$ on the *Double-line* C, for the length of 1 *Foot-ſolid*.

To do the ſame in *Foot-meaſure*; the ſide of the *Square* 7 *Inches*, in *Foot-Meaſure* is 58 parts; which ſaid 58 parts on the *Gert-line* D, being ſet to 1, on the *Double*

Double-line C ; then againſt 1 on the *Gert. line* D, is 2.94, that is 2 *Feet* 94 *parts*, or 2 *Feet* 11 *Inches* $\frac{1}{4}$ for the Length, to make one *Foot of Timber.*

PROB. V.

Having the Diameter of a Circle, or Round Piece of Timber ; to find the Side of a Square within the Circle, or to know how many Inches the Side of the Square will be when the Round Timber is ſquared.

The Rule.

Set always 8.5 on the *Double line* A, to 6 on the *Double line* B ; then againſt the *Diameter* on the *Line* A, is the Side of the *Square* on the *Line* B.

Example,

Let the *Diameter* be 18 *Inches* ; ſet 8.5 on A, to 6 on B ; then againſt 18 on A, is 12 $\frac{1}{4}$ on the *Line* B, for the Side of a *Square* within that *Circle.*

The ſame done in *Foot-Meaſure*, the *Diameter* being 18 *Inches* is in *Foot-meaſure* 1.5 ; Then ſet 1 on the *Double-line* A, always to .707 or .71 almoſt, on the *Double line* B ; then againſt the *Diameter* 1.5 on the *Double-Line* A, is 1.7 on the *Double-line* B ; that is *Foot* 1.7 *Tenths* the Side of a Square within a *Circle*, whoſe Diameter is Foot 1.5, Tenths. And here note the given Numbers 8.5, and 6 (but more truly 1, and .707, are, one the *Diameter* of a *Circle*, the other the Side of a *Square* within that *Circle*.

PROB. VI.

By having the Gert of a Tree, or Round Piece of Timber, to find the Side of a Square within.

The Rule.

Set 10 to 9 on the Line A and B, then againſt the *Gert* on the Line A, is the *Inches* for the Side of the *Square* on the Line B.

Example.

Let the *Gert* be 16 *Inches*, Set 10 on the Line A, to 9 on the Line B; then againſt 16 on the Line A is $14\frac{1}{4}$ on the Line B, for the Side of the *Square*.

By *Foot-Meaſure* it's thus; the *Gert* 16 *Inches* is *Foot* 1.33 *parts*; then ſet 10 on the *Double-line* A, to 9 on the *Double-line* B, and againſt the *Gert*, 1.33 on the *Double-line* A, is on the *Double-line* B, 1.19, that is 1 *Foot* 19 *parts*, which is 1 *Foot* 2 *Inches* $\frac{1}{4}$ for the ſide of the *Square* within.

And *Note*, The Numbers 10 and 9, or 1 and 9, ſhews when the Square within the Circle is 1, the fourth part of the Circumference $\frac{9}{10}$ parts of the ſame.

By theſe two laſt *Problems* you may known (before a Piece of Timber is hewn) how many *Boards* or *Planks* of any Thickneſs it will make.

PROB. VII.

By the fourth part of the Gert of Round *Timber, to find the ſide of a* Square *equal to it.*

The Rule.

Set 1 on the Line A, to 1. 128 on the Line B; then againſt the (one fourth of the whole) *Gert* on the Line A, is on the Line B, the Side of the Square equal to it.

Example. Let the *Gert* (that is the one fourth of the whole *Gert*) be 16 *Inches*: how much is the Side of the Square equal to it?

Set 1 to 1.128, but ſhortet to 1.13, on the Lines A and B; then againſt 16 on the Line A, is 18 on the Line B; which ſheweth that a Square whoſe ſide is 18 *Inches*, is equal to a Circle whoſe *Gert* is 64 *Inches*, or one fourth of its *Gert* is 16 *Inches*.

By *Foot-Meaſure*, the *Rule* being ſet as before, 1 againſt 1.13; then againſt *Foot* 1.33 *parts* (equal to 16 *Inches*) you will find 1.5, that is 1 *Foot* $\frac{5}{10}$, equal to 1 *Foot* 6 *Inches*, the ſide of a Square equal to the given *Gert*, the ſame as before.

CHAP. X.

To *Meaſure* Brick-Work

BRick-Work is meaſured by the *Rod* of 16 *Feet* and a half, whoſe *Square* is 272 $\frac{1}{4}$ which ſheweth that the Point on the *Double-line* is 272 $\frac{1}{4}$, but 272 being marked on the *Rule* will ſerve (without any conſiderable Error) a Brick and $\frac{1}{2}$ thick, and is the *Fix'd Number*.

An Example.

There is a *Brick-wall* whoſe Length is 564 *Feet*, the Height is 10 *Feet* and $\frac{1}{2}$: Set 272 on the *Double-line* A, to 564 on the *Line* B; then againſt 10 $\frac{1}{2}$ on the *Line* A, is 21 $\frac{7}{10}$ *Rod*, the *Content* on the *Double-line* B.

Note 1. Always the *Fix'd Number* that goeth with the Queſtion is called the firſt *Number*, which you may ſet to either of the other *Numbers*.

Note, 2. That 272 $\frac{1}{4}$ *Feet* makes a *Rod* of *Brick-work*, at a *Brick* and a half Thickneſs: if it be thicker fewer *Feet* go to a *Rod*; if thinner the more.

If you demand how many *Feet* makes a *Rod* at 2 *Bricks* Thickneſs: Two being the firſt or fix'd Number that goeth with the Queſtion muſt be ſet to 1 $\frac{1}{2}$; then againſt 272 $\frac{1}{4}$, is about 204, *viz.* 204 *Feet* $\frac{19}{100}$, and ſo for any other Thickneſs, for which

Take this General Rule.

Set 1 ½ to any Thickneſs; then againſt 272¼ on the ſecond *Length* is the *Number* of ***Feet*** that makes a *Rod* to that Thickneſs, and is called the *Firſt Number* for that Thickneſs, as in the *Table* following.

By this *Table*, made by the ſame *Rule*, by the *half Brick*'s Thickneſs of the *Wall*, you have the firſt *Number* by Inſpection: as thus, againſt 2 *Brick's* ½ or 5 half *Bricks* thick, is 163 ***Feet***, for a Square *Rod*, and ſo for any other.

½ Bricks thick	Square Feet in a Rod on the Superfices.	½ Bricks thick	Square Feet in a Rod on the Superficies.
½. 1	817 Feet	½. 7	117 Feet
1. 2	408 Feet	4. 8	102 Feet
½. 3	272 Feet	½. 9	91 Feet
2. 4	204 Feet	5. 10	82 Feet
½. 5	163 Feet	½. 11	74 Feet
3. 6	136 Feet	6. 12	68 Feet

CHAP. XI.

Meaſuring of Land.

LAND is uſually meaſured by the *Pole*, *Perch* or *Rod*, which is 16 ***Feet*** ½ *long*; 40 Poles in Length and 4 in Breadth makes an *Acre*, ſo that an *Acre of Land* contains 160 *ſquare Poles*, half and *Acre* is 80, and a quarter is 40.

Some uſe a *Pole-Chain*, and others a 4 *Pole-Chain*, the beſt for uſe is that of four Poles. This *Chain* is called *GUNTER*'s *Chain*. It is divided into 100 *Links* or Parts, every *Link* is 7 Inches and 92 Parts of an Inch in Length.

PROB. 1. *By the Pole Chain*, There is a Plot of Ground 35 Pole or Perch broad, and 185 Pole long, how many Acres is the Content?

By the Sliding Rule.

Thus, Set 160 to the Breadth, then againſt the Length is the Content?

Example.

Set 160 on the *Double-line* A, to 35 the Breadth on the *Double-line* B; then againſt 185, then Length on the Line A, is 40,$\frac{46}{100}$ (that is 40 *Acres* and almoſt $\frac{1}{2}$) on the *Double-line* B; the Content.

Arithmetically.

The Rule. Multiply the Length in Poles by the Breadth in Poles, and divide the Product by 160 (the Poles in an Acre) the Quotient is the Acres, if any remains, divide again,

$$\text{By}\left\{\begin{array}{c}120\\ 80\\ 40\end{array}\right\}\text{the Quotient is}\left\{\begin{array}{c}\frac{3}{4}\\ \frac{1}{2}\\ \frac{1}{4}\end{array}\right\}\text{of an Acre.}$$

Example

The Length ——— ——— 185 *Poles*
The Breadth ——— ——— ——— 35 *Poles*

925
555
16|0)647|5(40 *Ac.*
64
4|0)007|5(1 *quar*
4
35 *Poles remaining.*

But 75 *Pole* remaining after the firſt Diviſion, *viz.* by 160, which 75 being divided by 40 the laſt Remainder is 35, which makes the Content 40 *Acres* 1 *Quaater* and 35 P*oles*, or almoſt 40 *Acres* and $\frac{1}{2}$.

More Examples by the Rule.

Breadth		Length		Content
42	Pole.	49	Pole.	12 Acres $\frac{86}{100}$ or 12 $\frac{3}{4}$
53		64		21 Acres $\frac{2}{10}$ or 21 $\frac{1}{4}$
64		85		34 Acres juſt.

PROB. II.

By the four Pole*-Chain. There is a* Plot *of Ground containing* 16 *Chains* 25 *Links in Breadth, and* 57 *Chains* 30 *Links in Length, what is the Content of that piece of Land?*

By the ſliding Rule.

The Rule. Set 10 on the *Double-line*, to the Breadth in *Chains* and *Links* on the other, then againſt the Length in *Chains* and *Links* is the *Content*.

Example.

Set 10 on the *Double line* A, to 16.25 on the *Double-line* B, then againſt 57.30 on the *Double-line* A, is 93 *Acres* and ſomething more, for the Content on the *Double-line* B.

Arithmetically.

Length —— *Chains*—57.30 *Links.*
Breadth—*Chains*—16.25 *Links.*

28650
11460
34380
5730

Acres 93|11250 cut off 5 *Figures*
4

no Roods——|45000
40

Poles———18|00000

Note. 4 *Roods* makes an *Acre*, and 40 *Poles*. *Perches*, or *Rods* makes one *Rood*, or *Quarter* of an *Acre*.

More Examples by the Rule.

Breadth	Length	
3.35	15.32	5 Acres a little more
4.53	16.42	7 Acres ½ almoſt
16.28	72.51	118 Acres

Note, *Gunter's Chain* containeth 4 *Statute Poles* in 100 *Links*, ſo that any number of *Chains* is no more than ſo many 100 *Links*; as 4 *Chains*, is 400 *Links*, 6 *Chains* is 600 *Links*

Links, &c. and 160 ſquare *Statute Poles* is an *Acre*, each *Pole being* 16 *Feet* and a half. Therefore in a ſquare *Chain* is 16 ſquare *Poles*. If you divide 160 (the ſquare *Poles* in an *Acre*) by 16 (the ſquare *Poles* in a *Chain*) the Quotient is 10, to the ſquare *Chains* in an *Acre*.

A *Square Chain* contains 10000 *Square Links* (for it is 100 multiplied by 100) and conſequently an *Acre* is 100000 *Square Links*.

Therefore the Reaſon of the foregoing *Operation* is evident, for if you multiply 5730 *Links* by 1625 *Links*, the Product will be 9311250 *Square Links*. Divide 9311250 by 100000 (the *Square Links* in an *Acre*) the Quotient is *Acres*, and the Remainder is parts of an *Acre*. But to divide by 100000 is no more than to cut off five Figures to the Right-hand, ſo will the Remaining Figures to the Left-hand be *Acres*, and thoſe cut off to the Right-hand 11250, are parts of an *Acre*: Again multiply thoſe five Figures cut off from the Right-hand, of the Product, by 4, aud from the Product cut off five Figures to the Right-hand thoſe on the Left hand will be *Roods*, and if thoſe cut off be multiplied by 40, and from the Product five Figures be cut off from the Right-hand, thoſe on the Left-hand, are Poles or Perches

So in the Preceding Operation there is 93 *Acres*, no Roods, 18 Perches for the *Content*.

PROB. III.

How to reduce Statute-Meaſure to Cuſtomary, and the Contrary.

ACcording to a *Statute* made in the 33*d* of *Edward* the I. and likewiſe in the 25*th* of *Elizabeth* a Statute Pole is 16 Feet and ½ long. Now divers parts of *England* uſes a Pole of 18 Feet long, and ſome a Pole of 21 Feet long, and others a Pole of 24 Feet long. Therefore to turn one ſort of Meaſure into another; ſuppoſe *Statute* into *Cuſtomary*, do thus; multiply any Number of Acres, Roods, and Perches *Statute-meaſure*, by the ſquare half *Yards*, or ſquare half *Feet*, in a ſquare Pole of *Statute Meaſure*, the Product divide by the ſquare half *Yards*, or ſquare half *Feet* in a Pole of the *Cuſtomary-meaſure*, the Quotient gives you the Acres, Roods, and Perches of that *Cuſtomary-meaſure*; as for *Example*. In 172 Acres, *Statute-meaſure*, how many Acres of 18 Feet to the Pole or Perch?

In a *Statute* Pole or Perch, there is five *Yards* and a half, that is 11 half *Yards*; conſequently in a ſquare *Statute* Pole there is 121 ſquare half *Yards*, and in a ſquare Pole of 18 Feet. there is 144 ſquare half *Yards*,

172 Acres Statute Meaſure.
121 Square half Y. in a Statute Pole.
172
344
172
144)20812(144 Acres Cuſtomary and $\frac{76}{144}$.
144
0641
576
0652
576
076 Overplus.

Therefore the Cuſtomary Acres (at 18 *feet* to a Perch) is 144 $\frac{76}{144}$ of an Acre, the Overplus multiply by 4, and the Product Divide by 144 gives Roods; again, multiply the Remainder by 40, and the Product divide by 144, the Quotient will be Perches; as by the following Operation of the preceeding Remainder.

76 Overplus, or Remainder.
4
144)304(2 Roods
288
016
40
144)640(4 Perches.
576
004.

So that 172 *Acres Statute-Meaſure* is 144 *Acres*, 2 *Roods* and 4 *Perches*, with a ſmall Remainder (not worth taking notice) of *Cuſtomary-Meaſure*, of 18 *Feet* to the *Pole* or *Perch*.

If there had been any given *Roods* and *Perches* with the *Acres*, then you muſt turn all into *Perches*, and having multiplied and divided as before directed, divide the Quotient by 160, or 40, and that Quotient again by 4.

PROB. IV. *In* 543 *Cuſtomary Acres, at 18 Foot to the Perch, how many Acres of Statute Meaſure?*

543 *Cuſtomary Acres.*
144 ſquare ½ Y. in a *Cuſtomary Acre,*
2172
2172
543
121(78192(640 *Statute Acres.*
726
0559
484
0752
726
26 Remainder multiplied
by — — 4
104 no *Roods*
40
121)4160(34 *Perches,*
363
0530
484
046 Remains.

Here you ſee that in 543 *Cuſtomary Acres* at 18 *Feet* the *Perch* there are 646 *Acres,* no *Roods,* 34 *Perches Statute-Meaſure* and $\frac{46}{121}$.

Cuſtomary Acres as well as *Statute Acres,* contain 160 *Square Perches,* the bigneſs is only in the bigneſs of the *Perch.*

FINIS.

Note, This Rule, or any other, and all ſorts of *Mathematical Inſtruments* are Sold at Reaſonable Rates, at *Cherry Garden ſtairs*, on *Rotherhith Wall*, *London*.

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